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SQUALOR SYNDROME AND ORBITAL FRONTAL DAMAGE

Squalor syndrome is a behavioral disorder that is characterized by extreme self neglect and domestic squalor. People with this syndrome usually display collecting behavior and a tendency toward amassing rubbish, with a lack of sense of shame. Some have suggested that this syndrome is attributable to frontal lobe pathology. This report describes a patient with acquired squalor syndrome with orbital frontal damage after a subarachnoid hemorrhage.

This case involved a 49-year-old, right-handed woman with no past history of neurologic or psychiatric disease. She had been working reliably at a nursery school for 15 years when she suffered a rupture of an anterior communicating artery aneurysm at the age of 40 years. After hospital discharge, she was able to independently shop and cook, as well as to discuss her children's education with teachers. She showed occasional difficulties with working memory. She did, however, begin to accumulate a large number of objects in her home, which was maintained in a severely squalid and unsanitary condition.

The patient's house became knee deep in filth and refuse, with rooms cluttered with trash, newspapers, bottles and rags. She did not bathe unless forced to do so, and seldom brushed her teeth. She ate excessively and gained 20 kg. over several years. At the age of 49 years, a computed tomography scan of the head showed low-density areas in the bilateral orbitofrontal cortices, basal forebrain, right caudate and adjacent white matter. The damage to the caudate occurred primarily in the ventral medial portion. Brain single photon emission tomography showed decreased regional cerebral blood flow, mainly in the bilateral orbital frontal cortices and basal forebrain.

Conclusion: This study describes the case of a 49-year-old housewife with new onset of squalor syndrome following an orbital frontal lesion due to an anterior communicating artery aneurysm.

Funayama, M., et al. Squalor Syndrome after Focal Orbital Frontal Damage. *Cog Beh Neur*. 2010, June; 23(2): 135-139.

TEETH CARE AND CARDIOVASCULAR DISEASE

While previous epidemiologic studies have examined the association between oral health and cardiovascular disease, the association between self-reported oral hygiene behavior and incident cardiovascular disease has not been previously examined in a large population study.

Data were obtained from the Scottish Health Survey, a cross-sectional survey that drew on a nationally representative sample of the general population living in Scottish households. For this analysis, data were combined from 1995, 1998 and 2003 surveys. Survey interviewers visited eligible households, measuring height and weight and collecting data concerning demographics and health behaviors, including oral health. Medical history and family history were obtained, including data regarding cardiovascular disease and blood pressure. In a subsample of 4,830 participants, blood samples were obtained for the assessment of C-reactive protein and fibrinogen. The surveys were linked to a database of hospital admissions and deaths in patients, with follow-up until December of 2007. The primary endpoint was a composite of fatal and nonfatal cardiovascular disease events.

Oral health behavior was good, with 62% of participants reporting

regular visits to a dentist and 71% reporting good oral hygiene (brushing teeth twice a day). In age and gender adjusted analyses, participants reporting poor dental hygiene were at increased risk of cardiovascular disease events and cardiovascular disease related death. Participants who reported less frequent tooth brushing had a 70% increased risk of cardiovascular disease events as compared to those who brushed twice per day. Significant associations were seen between the frequency of tooth brushing and markers of low-grade systemic inflammation. Participants who brushed their teeth less often had increased concentrations of both C-reactive protein and fibrinogen. The other independent predictors of cardiovascular disease events included smoking, hypertension and diabetes.

Conclusion: This study demonstrates that poor oral hygiene is associated with an increased risk of cardiovascular disease.

De Oliveira, C., et al. Toothbrushing, Inflammation and Risk of Cardiovascular Disease: Results from Scottish Health Survey. *BMJ*. 2010, May; 340: c2451.

INJURY RATE IN PEE WEE ICE HOCKEY WITH BODY CHECKING

Ice hockey is popular in North America, with more than 550,000 registered youth players in Hockey Canada and more than 340,000 registered players in the USA Hockey Association. Canadian data suggest that hockey injuries account for 10% of all youth sports injuries. Body checking has been associated with 45% to 86% of injuries among youth hockey players. This study compared the injury and concussion risk in youth ice hockey players who played in a league permitting body checking

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with those in a league where body checking was not permitted.

This prospective study gathered data from October of 2007 to March of 2008 for hockey players ages 11 to 12 in Alberta, which allows body checking, and in Québec, where body checking is not allowed. Data were obtained for 1,108 players from Alberta and 1,046 players from Québec. Using preseason questionnaires and ongoing reports by the individual coaches, injury data were collected for comparison between the two regions.

Results revealed that 241 injuries occurred in Alberta and 91 in Québec. The incidence ratios upon comparing Alberta to Québec were 3.07 for game injuries, 3.3 for severe injuries, 3.75 for concussions and 3.614 for severe concussions. The intentional contact injury rate was twice as high in the checking region than in the no checking region. In addition, a threefold increase in risk of all game related injuries was found, including concussion, severe concussion and severe injury in pee wee ice hockey leagues when body checking was permitted, as compared to those leagues where it was not. No significant difference was seen between the provinces in practice related injuries.

Conclusion: This study of 11- to 12-year-old hockey players found a threefold increase in the risk of all game-related injuries when body checking is permitted, as compared to when it is not.

Emery, C., et al. Risk of Injury Associated with Body Checking among Youth Ice Hockey Players. **JAMA.** 2010, June 9; 303(22): 2265-2275.

TOTAL HIP RESURFACING AND SPORTS ACTIVITY

Manufacturers of hip resurfacing implants suggest the possibility of high-level sports activities after total hip resurfacing. However, most recommendations concerning sports activity after hip replacement include the avoidance of high impact sports. This study sought to further clarify the level of sports activity that occurs among patients who undergo total hip arthroplasty.

This study included 159, consecutive hip resurfacing procedures, completed in 145

patients. All procedures were completed under general anesthesia, with partial weight bearing recommended for one week after surgery, and full weight-bearing thereafter. Range of motion restrictions were suggested for six weeks after surgery. All patients were invited to participate in a standardized follow-up, including questionnaires, a clinical examination and radiographs. Each questionnaire evaluated sports activity before the onset of hip pain and at the time of follow-up. Sports activities were classified as low, intermediate or high impact. Seven patients were lost to follow-up.

Before surgery, the patients were involved in a mean of 3.6 sports disciplines. After surgery, this number dropped to 3.2 sports. However, the duration of sports per patient per week increased significantly after surgery ($p=0.007$). At two-year follow-up, 82% of the patients felt no restriction of their operated hip while performing sports, while 16% felt restricted. Due to uncertainties, six patients had given up some sports, and five performed their sports with limitations. When asked which sports given up after surgery that they would like to have continued, 67 percent reported no such sports, while the remaining reported downhill skiing, jogging, soccer and tennis as the most missed activities. The majority had made that decision without the advice of their physicians.

Conclusion: This study of patients undergoing total hip arthroplasty demonstrates that, after surgery, the number of sports declines, although the majority reported no limitations to their choice of sports. One third, however, reported a decline in high and intermediate impact sports.

Banerjee, M., et al. Sports Activity after Total Hip Resurfacing. **Am J Sp Med.** 2010, June; 38 (6): 1229-1237.

CAFFEINE INGESTION AND MUSCLE STRENGTH AND ENDURANCE

Evidence from previous studies strongly suggests that caffeine ingestion enhances performance during both endurance and short-term, high intensity exercise. This study sought to clarify caffeine's effect on muscle function using a meta-analytic approach.

A systematic literature review was performed in an effort to obtain data concerning the effects of caffeine ingestion on maximal voluntary contraction (MVC) and on muscular endurance. The extracted muscular strength and endurance data were converted to a standard format by calculating the standardized mean differences.

A total of 1,705, relevant publications were originally identified through database searches and reviews of article reference lists. From those, 34 studies published between 1939 and 2008 were included for meta-analyses concerning caffeine's effects on MVC strength (n = 27 studies) and muscular endurance (n = 23 studies).

Twenty-three of the 27 studies demonstrated positive, beneficial effects of caffeine as compared with placebo. Overall, meta-analysis of the 27 studies yielded a statistically significant and small effect size (ES), indicating that caffeine ingestion can improve MVC strength (p = 0.0003). This ES equates approximately to four percent greater strength after ingestion of caffeine as compared with placebo. Overall, meta-analysis of the 23 endurance studies indicated a small, but significant, beneficial effect of caffeine ingestion on muscular endurance (p = 0.00005). This ES equated to approximately a 14% improvement in muscular endurance after ingestion of caffeine, as compared with placebo.

Conclusion: This meta-analysis of the effects of caffeine ingestion on muscle performance suggests that caffeine can increase strength by an average of four percent and endurance by an average of 14%.

Warren, G., et al. Effect of Caffeine Ingestion on Muscular Strength and Endurance. *Med Sci Sport Exer.* 2010, July; 42(7): 1375-1387.

COMFREY ROOT EXTRACT OINTMENT FOR ACUTE BACK PAIN

Current treatments for back pain include physical therapy, heat and pharmacotherapy. Among the topical agents, comfrey root has been tested as a treatment for a variety of muscle and joint complaints. This study sought to determine the effect of comfrey root extract ointment for

patients with acute upper or lower back pain.

This randomized, double-blind, placebo-controlled trial included 120 patients with acute upper or lower back pain. The participants were randomized to receive comfrey root extract (100 g) or a placebo, applied over the affected area for a period of five days. The patients were evaluated for effects on day one, at one hour after the initial treatment and then again at days three and five. The primary outcome measure was the area under the curve of the visual analogue scale for pain during standardized tests for upper and lower back pain. Secondary outcomes included pain at rest, pressure algometry, global assessment of efficacy and scores on the Oswestry Disability Index (ODI).

Patients treated with comfrey demonstrated significantly greater improvement in pain intensity during active, standardized movements than did a placebo group (a 95.2% decrease versus a 37.8% decrease; p<0.001). Among the secondary outcomes, pain at rest, pressure algometry, global assessment of efficacy and ODI scores, superior effects were found in the comfrey group, as compared to the placebo group (p<0.001 for all). No significant differences were seen between the groups in adverse events.

Conclusion: This study of patients with acute back pain demonstrates that comfrey root extract ointment is a safe and effective treatment.

Giannetti, B., et al. Efficacy and Safety of Comfrey Root Extract Ointment in the Treatment of Acute Upper or Lower Back Pain: Results of a Double-Blind, Randomized, Placebo Controlled, Multi-Center Trial. *Br J Sp Med.* 2010, July; 44(9): 637-641.

PREDICTORS OF STAIR USAGE AFTER TOTAL KNEE ARTHROPLASTY

Total knee arthroplasty (TKA) is the most common surgical intervention for the treatment of osteoarthritis. However, some limitations have been noted after surgery, with the ability to negotiate stairs often a major concern. This study sought to determine which preoperative variables are most

predictive of stair negotiation following TKA.

One hundred five subjects (median age 65.5 years) scheduled for primary TKA, and 64 subjects (median age 63 years) without a history of knee pain or osteoarthritis were studied. The subjects were evaluated preoperatively, at three months and at two years post-surgery. The control group was evaluated at baseline and then again at two years. The variables examined included age, body mass index, height, weight, active range of motion, bilateral quadriceps strength, results of a knee outcomes survey, time to complete a stair climbing task and handrail use.

Prior to surgery, sixty-three of the 105 patients required a handrail, whereas, two years post-surgery, 60 of the 105 required a handrail. At baseline, nineteen of the sixty-four subjects in the control group required a handrail. Thirty-one control subjects returned for the two-year follow-up and, of those, ten required a handrail at that time point. The preoperative variables most predictive of handrail usage at two years were previous handrail use, older age and weaker quadriceps strength. If used collectively, these three variables predicted the ability of 90 of 105 subjects to negotiate stairs.

Conclusion: This study suggests that patients who are younger, stronger and do not use a handrail prior to surgery have the best outcomes for stair negotiation after a primary total knee arthroplasty.

Zeni, J., et al. Preoperative Predictors of Persistent Impairments during Stair Ascent and Descent after Total Knee Arthroplasty. *J Bone Joint Surg (Am).* 2010, May; 92: 1130-1136.

ULTRASOUND TO DIAGNOSE ELBOW TENDINOPATHY

Lateral elbow tendinopathy refers to tenderness at the common extensor origin, exacerbated by wrist extension. This entity is associated with disruption of collagen fibers with few inflammatory cells. Ultrasound (US) findings in tendinopathy have been well documented, with both structural changes and blood flow changes described. This study sought to identify which US findings are correlated with clinical outcomes.

This multicenter cohort study examined 62 elbows in 62 patients who were diagnosed with lateral elbow tendinopathy. The subjects were first administered a validated pain severity and function disability scale called the Patient-Rated Tennis Elbow Evaluation (PRTEE). The scale assessed pain on a 100-point visual analogue scale. All participants underwent sonographic evaluation and received physical therapy focused on eccentric loading and stretching. After six months of physical therapy, the PRTEE was repeated.

Baseline PRTEE scores ranged from 51 to 79, with a mean score of 78. Post-treatment scores at six months ranged from 0 to 91, with a mean of 29 ($p < 0.001$). The wide range of post-treatment scores reflected 17 patients who reported no response to treatment. Of those, 94% had ligament tears with a mean size of 8 mm as measured on initial sonograph. The presence of a lateral collateral ligament tear was associated with a poor outcome ($p < 0.0001$). In addition, the size of the largest intrasubstance tear was linearly related to high baseline PRTEE scores. Of the 45 patients who showed improvement, 84% had ligamentous tears measuring less than 4 mm by US. No significant relationship was found with age, symptom duration, tendon thickness or neovascularity.

Conclusion: This study of patients with lateral epicondylitis found that the presence of a lateral collateral ligament tear, as measured by ultrasound, was significantly related to poor outcome.

Clarke, A., et al. Lateral Elbow Tendinopathy: Correlation of Ultrasound Findings with Pain and Functional Disability. *Am J Sports Med.* 2010, June; 38(6) 1209-1214.

ACTIVE VERSUS PASSIVE MOTION THERAPY AFTER FLEXOR TENDON REPAIR

Full recovery of active digit motion and prevention of stiffness and contracture remain problematic after zone II flexor tendon injuries of the hand. Previous studies have demonstrated that early passive motion improves clinical results to a greater extent than does prolonged immobilization following flexor tendon

repair. Some have expressed concern that active motion protocols might increase the risk of tendon rupture. This study compared active and passive therapy for the treatment of patients with recent surgery.

Ninety-three patients with zone II flexor tendon repairs were randomly assigned to either early active motion with place and hold or passive range of motion. The active therapy protocol required the use of a hinged splint that allowed for wrist extension while still maintaining the metacarpophalangeal joints in flexion. Outcome measures included the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire, range of motion, tests of hand dexterity and demographic data. Outcome measures were taken at six, 12, 26 and 52 weeks following repair.

Patients in the active motion protocol group had significantly greater motion than patients in the passive motion protocol at six, 12, 26 and 52 weeks' follow-up points ($p < 0.05$). At one-year follow-up evaluation, the average DASH scores were 2.0 for the active motion group and 3.1 for the passive motion group ($p = 0.09$). The average score for patient satisfaction was greater for the active group than for the passive group ($p < 0.05$). Two tendon ruptures were documented in each group. Smokers, patients with concomitant nerve injury, and those with multiple digit injuries had a smaller range of motion, larger flexion contractures, and decreased satisfaction scores than did those without such morbidities.

Conclusion: This study of patients with recent flexor tendon repairs demonstrates significantly greater range of motion and greater satisfaction with the outcome following active range of motion protocols, as compared with passive protocols.

Trumble, T., et al. Zone II Flexor Tendon Repair: A Randomized, Prospective Trial of Active Place and Hold Therapy Compared with Passive Motion Therapy. *J Bone Joint Surg.* 2010, June 1; 92(6): 1381-1389.

STATIN TREATMENT AFTER STROKE

Several studies have led the American Heart Association to recommend in-hospital initiation of

statin therapy for patients with stroke or transient ischemic attack of atherosclerotic origin. Among these, the Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) trial demonstrated that, among individuals with recent, symptomatic cerebral vascular disease and no known coronary artery disease, the incidence of vascular events, including stroke, was significantly lower in those treated with high doses of statins than in those treated with placebo. This study assessed recent, nationwide trends in discharge statin treatment among patients with ischemic stroke, in an effort to determine whether such treatment has changed in response to the dissemination of the recent SPARCL results.

Data were obtained from a nationwide quality improvement initiative, geared toward fostering improved adherence to guideline-based care in patients hospitalized with stroke or transient ischemic attack. Data were evaluated between January of 2005 and December of 2007, with discharge data compared from before and after the release of the SPARCL study results.

This sample comprised 119,746 patients with ischemic stroke and 53,538 with transient ischemic attack. The participants' mean age was 68.3 years, with the slight majority being women. Discharge use of lipid lowering medication was 83.5%, with statins prescribed in 79.2% of the cases. Patients receiving lipid lowering therapy before hospitalization were more likely to be discharged on a statin than were those not previously receiving that medication ($p < 0.0001$). The rates of discharge statin use by hospitals ranged from 59.5% to 91%. The frequency of statin prescriptions at discharge climbed over the three-year observation period from 75.7% in January of 2005 to 84.8% in December of 2007. The release of the SPARCL data did not seem to accelerate this trend.

Conclusion: This nationwide study found that the use of statin medications at discharge for patients hospitalized with ischemic stroke or transient ischemic attack increased steadily from 2005 to 2007.

Ovbiagele, B., et al. Recent Nationwide Trends in Discharge Statin Treatment of Hospitalized

Patients with Stroke. **Stroke**. 2010, July 1; 41(7): 1508-1513.

INTELLECTUAL ENRICHMENT AND MULTIPLE SCLEROSIS

Patients with multiple sclerosis (MS) often suffer from memory and learning impairments, although these deficits are not well correlated with disease activity. The cognitive reserve hypothesis states that greater lifetime intellectual enrichment lessens the negative impact of brain disease on cognition. This study sought to test this hypothesis in patients with MS.

Forty-four patients diagnosed with MS underwent assessment of verbal learning and memory using the Selective Reminding Test. Researchers estimated intellectual enrichment through the vocabulary subtest of the Wechsler Abbreviated Scale of Intelligence. MRI measurements of the third ventricle were used to determine the degree of brain atrophy. Regression analysis and analysis of variance were then used to examine the relationships between brain atrophy and intellectual enrichment and verbal learning and memory.

A negative regression correlation was found with brain atrophy and learning and memory. These effects were attenuated more in patients with higher intellectual enrichment than in those with lower intellectual enrichment. Greater brain atrophy was also associated with inefficient learning among patients with lower intellectual enrichment, but not among those with higher intellectual enrichment.

Conclusion: This study suggests that higher lifetime intellectual enrichment, as estimated by vocabulary knowledge, may lessen the negative impact of MS disease severity on cognition. The authors suggest that patients with MS with lower intellectual enrichment at baseline may benefit from learning and memory rehabilitation as a means to lessen cognitive impairment.

Sumowski, J., et al. Intellectual Enrichment Lessens the Effect of Brain Atrophy on Learning and Memory in Multiple Sclerosis. **Neur**. 2010, June; 74 (24): 1942-1945.

LATE RECOVERY AFTER TRAUMATIC, ANOXIC OR HEMORRHAGIC VEGETATIVE STATE

According to previous epidemiologic studies, the prognosis of vegetative state (VS), late recovery of consciousness beyond 12 months after onset of traumatic brain injury (TBI) and beyond three months after non-traumatic brain injury, is very guarded. Diagnostic criteria have been recently developed for conditions characterized by inconsistent responsiveness, i.e., minimally conscious states (MCS). MCS had not been identified when early epidemiologic studies were performed. This study sought to verify the frequency of late recovery of responsiveness and consciousness among patients with VS of at least six months' duration.

Subjects in this study included all patients admitted to the Institute for Rehabilitation, Salvatore Maugeri Foundation, in Telese, Italy, between 2005 in 2007. All subjects were in a vegetative state for at least six months after onset. Of these conditions, 36% resulted from TBI, 36% from hemorrhagic brain injury, and 28% from anoxic brain injury. All patients were followed for a mean of 25.7 months from onset, with level of responsiveness and functional disability measured by validated scales.

Twenty-one patients (42%) died during the study period. Among the 29 survivors, 34% showed no evolution from a vegetative state at long-term follow-up. The remaining 12 survivors recovered responsiveness, with 10 showing this recovery from 14 to 28 months after onset. Most of the late recoveries occurred in posttraumatic patients, although this finding did not reach statistical significance. The mean age of survivors with late recovery was lower than that of survivors still in a vegetative state at the end of the study (an average of 31.9 versus 53.9 years; $p=0.001$).

Conclusion: This study demonstrates that, among patients in a vegetative state for at least six months, 20% experience late recovery of responsiveness, with 12% progressing to consciousness. Late recovery was associated with a younger age and traumatic, as compared to atraumatic, etiology.

Estraneo, A., et al. Late Recovery after Traumatic, Anoxic or Hemorrhagic, Long-Lasting Vegetative State. **Neur**. 2010, July; 75(3): 239-245.

PROTECTIVE EFFECT OF HIGH DENSITY LIPOPROTEIN FOR EMBOLIC STROKE

Epidemiologic studies have found an inverse association between high density lipoprotein (HDL), cholesterol levels and cerebrovascular events. In addition to reversing cholesterol transport, HDL particles exert anti-inflammatory, antiprotease and anti-thrombotic effects that may protect endothelial cells from acute injury. Administration of reconstituted HDL has been shown to normalize endothelial dysfunction among patients with hypercholesterolemia and to reduce polymorphonuclear adhesion and transmigration. This study sought to determine whether HDL injection can decrease polymorphonuclear neutrophil recruitment in the ischemic area after stroke.

In this animal study, rats were injected with purified HDL or saline placebo immediately or at one or three hours after stroke onset. The rats were evaluated for mortality rate and neurological deficits at 24 hours after stroke, using the modified Neurological Severity Score. The subjects were then euthanized 24 hours after stroke onset for measurement of infarction volume and blood brain barrier breakdown. Protease activities and neutrophil infiltration were also assessed.

Compared with saline injection, those receiving HDL immediately after stroke demonstrated significantly decreased stroke related deaths at 24 hours (68.4%; $p=0.015$), with a significantly reduced infarction size immediately and three and five hours after stroke ($p=0.0003$, $p=0.011$ and $p=0.019$, respectively). This protective effect was dose dependent. At 24 hours post-stroke, the neurologic deficit was decreased to a greater extent in the HDL treated group than in the saline group ($p=0.015$). In addition, HDL treatment reduced blood brain permeability by 64% ($p=0.0666$) as compared with controls. Brain edema and PMN recruitment were also significantly less in the HDL group than in the control group ($p=0.01$ and $p=0.027$, respectively).

Conclusion: This animal study demonstrates that the administration of HDL after an ischemic stroke may be neuroprotective by maintaining the blood brain barrier and limiting neutrophil recruitment.

Lapergue, B., et al. Protective Effect of High Density Lipoprotein-Based Therapy in a Model of Embolic Stroke. *Stroke*. 2010, July; 41: 1536-1542.

COGNITIVE EFFECTS OF OPIOIDS FOR CHRONIC NON-CANCER PAIN

In the last decade, rapidly increasing use of opioids for chronic, non-cancer pain has been reported in several countries. Providers have expressed concern regarding long-term opioid use, including tolerance, dependency, fear of addiction and fear of diversion. In addition, some have expressed concern about the potential for cognitive dysfunction. This study reviewed the current literature in order to summarize the findings concerning the cognitive effects of long-term opioid use for the treatment of non-cancer pain.

Medical literature was reviewed using Pub Med, EMBASE, PsycInfo, CINAHL and Lilacs and Cochrane Systemic Reviews. Eligibility criteria for the studies included non-cancer pain with a minimum of one month of opioid treatment, a controlled study, a neuropsychological assessment and the article written in English. A total of 13 studies were included in the review, with three, randomized, controlled trials, two, nonrandomized, comparative studies and eight observational studies.

In two of the randomized, controlled trials and in two of the nonrandomized, controlled trials, subjects demonstrated improvements in information processing, attention, psychomotor speed, manual dexterity and memory after the onset of opioid treatment. Two observational studies found greater decreases in attention, vigilance, working memory, psychomotor speed and sustained attention after opioid use, as compared to control conditions. Three studies showed positive relationships between pain relief and improved cognition.

Conclusion: This literature review provides evidence that opioid use in non-cancer pain may result in either

no alteration, or some improvement, in cognition.

Kendall, S., et al. The Cognitive Effects of Opioids in Chronic Non-Cancer Pain. *Pain*. 2010, August; 150(2) 225-230.

REFERRED SENSATIONS AND NEUROPATHIC PAIN FOLLOWING SPINAL CORD INJURY

Referred sensations have been described following a late amputation, brachial plexus avulsion and stroke. These phenomena have also been reported in patients with spinal cord injury (SCI). Some have suggested that painful and non-painful sensations are associated with the reorganization of sensory pathways among patients with complete SCI. This study sought to determine whether referred sensations are more common among patients with SCI and neuropathic pain than among those with SCI without such pain.

Forty-eight patients were included in this study. Each had sustained a complete SCI above T12. Twenty-four had neuropathic pain and the other 24 had no neuropathic pain or spontaneous paresthesias. Each subject was examined at study onset, and then at two weeks and six to eight weeks post-baseline. Multiple key sensory points in dermatomes above the SCI level were stimulated using both a pinprick and a soft swab. Points at which the subjects felt a referred sensation were recorded. In addition, all participants underwent motor evoked potentials elicited by a single transcranial magnetic stimuli. Comparisons were made between the groups of patients with versus without neuropathic pain. In addition, those with neuropathic pain were divided into groups of those with versus without referred symptoms.

Seven patients with spinal cord injury and neuropathic pain reported referred sensations below the injury level. Visual feedback did not change referred sensation perception and characteristics. None of patients without neuropathic pain presented with referred sensations.

Conclusion: This study found that referred symptoms are more common among patients with spinal cord injuries who experience neuropathic pain than among those without neuropathic pain.

Soler, M., et al. Referred Sensations and Neuropathic Pain Following Spinal Cord Injury. *Pain*. 2010, July; 150 (1); 192-198.

EFFECTIVENESS OF VIRTUAL REALITY USING WII GAMING FOR STROKE REHABILITATION

Recent evidence suggests that repetitive, task-oriented training of a paretic extremity after stroke can be beneficial. Virtual reality gaming systems are novel and potentially useful technology allowing users to interact in three dimensions with computer generated scenarios. This study examined the feasibility and safety of the Nintendo virtual reality Wii gaming system, as compared with recreational therapy, for facilitating motor function among patients with stroke.

Twenty-two patients screened at the Toronto Rehabilitation Institute were randomized to receive either Wii training or recreational therapy training in addition to standard rehabilitation services. Software used in the Wii group included "Wii Sports" and "Cooking Mama." The recreational therapy group played cards, bingo or "Jenja." Both groups received an intensive program of eight interventional sessions of 60 minutes' duration, each over a 14-day period.

Baseline measurements included demographics, handedness, comorbidity conditions, stroke characteristics and baseline disability measures. Stroke severity was assessed with the Canadian Neurological Scale. Baseline motor function was evaluated using the Wolf Motor Function Test and the Box and Block Test, while quality of life was assessed with the Stroke Impact Scale.

No participant in the study experienced a serious adverse event. No difference was seen between the groups in the mean time for delivered interventions. Participants in the Wii group enjoyed greater improvement in Wolf Motor Function Test scores and slightly, although non-significantly, greater improvement in grip strength than did the recreation therapy group.

Conclusion: This study demonstrates that the Wii gaming system is safe, feasible and potentially effective as an alternative to enhance motor function recovery in patients with recent stroke.

Saposnik, G., et al. Effectiveness of Virtual Reality Using Wii Gaming Technology in Stroke Rehabilitation. *Stroke*; 2010, July 41: 1477-1484.

ROLE OF SYSTOLIC BLOOD PRESSURE AND CARDIOVASCULAR RISK

In 1993, the Fifth Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure recommended that the treatment goal for patients with diabetes be less than 130/80 mmHg. Currently, limited data are available on which to base recommendations for blood pressure goals for patients with diabetes and coronary artery disease (CAD). This observational study investigated blood pressure goals achieved and cardiovascular outcomes among hypertensive patients with diabetes and CAD.

Data for this study were derived from a prospective, randomized trial comparing clinical outcomes of patients with hypertension and CAD, enrolled between 2000 and 2003. From these data, 6,400 were identified with diabetes at baseline. Those subjects were categorized into three groups by their average systolic blood pressure readings while taking the study medication: tight control of less than 130 mmHg; usual control of 130 to 140 mmHg; or uncontrolled of 140 mmHg or higher. Blood pressure, medication compliance and adverse cardiovascular outcomes were evaluated every six weeks for the first six months, and then twice a year for a minimum of two years. The primary outcome variable was adverse cardiovascular outcomes, including the first occurrence of all cause death, nonfatal myocardial infarction, or nonfatal stroke.

Blood pressure data revealed that 35.2% had tight control, 30.8% usual control and 34% uncontrolled systolic blood pressure. The primary outcome occurred in 12.6% of those with usual control and in 19.8% of those with uncontrolled systolic blood pressure ($p < 0.001$). However, little difference was found between those with usual control and those with tight control. The follow-up risk of all-cause mortality after adjustment was 22.8% in tight control and 21.8% in usual control patients ($p = 0.04$).

Conclusion: This study of patients with diabetes and coronary

artery disease did not find that control of systolic blood pressure to less than 130 mmHg improves cardiovascular outcomes more than does control under 140 mmHg.

Cooper-DeHoff, R., et al. Tight Blood Pressure Control and Cardiovascular Outcomes among Hypertensive Patients with Diabetes and Coronary Artery Disease. *JAMA*. 2010, July 7; 304(1): 61-68.

BEHAVIORAL VERSUS MANUAL THERAPY FOR NECK PAIN

The point prevalence of neck pain in the general population of the Netherlands is estimated to be between nine and 22%. Approximately one third of all adults experience neck pain during the course of a year. While no conclusive evidence is available regarding the specific pathology in the majority of cases of acute or chronic neck pain, psychological and social factors may aggravate and perpetuate this pain. As such, behavioral treatment has been proposed to be a means of addressing this pain. One such treatment, behavioral graded activity (BGA), has been explored for low back pain, but not for neck pain. This study sought to determine the effectiveness of a BGA program for neck pain.

This randomized, controlled trial included patients identified from January of 2003 through January of 2005. A total of 146 patients were referred by their general practitioners, with all subjects complaining of neck pain. Subacute neck pain was defined as four to 12 weeks of neck pain without a specific, identified etiology. The patients were randomly assigned to a BGA or manual therapy group. Manual therapy was performed by physical therapists with a three-year postgraduate degree in manual therapy.

Behavioral graded therapy was performed by physical therapists with at least 10 years' experience and with additional training in BGA therapy. This therapy was based upon operant conditioning. Primary outcome variables were global perceived effect, Numerical Rating Scale for Pain scores and Neck Disability Index scores. Secondary outcomes included the Tampa Scale for Kinesiophobia, a four-dimensional symptom questionnaire, and the Pain Coping and Cognitive List.

Measurements were made at baseline and at six, 13, 26 and 52 weeks.

Of the primary outcome measures, Neck Disability Index scores improved more among those receiving BGA ($p = 0.05$). No other significant differences were seen between the groups on any of the other primary or secondary outcome measures.

Conclusion: This study comparing manual and behavioral therapies for the treatment of subacute neck pain found a slight advantage in favor of behavioral therapy.

Pool, J., et al. Behavioral Graded Activity Program More Effective than Manual Therapy in Patients with Subacute Neck Pain? *Spine*. 2010, May 1; 35(10): 1017-1024.

ELECTRICAL STIMULATION AND RESISTANCE TRAINING FOR QUADRICEPS STRENGTHENING IN SPINAL CORD INJURY

Resistance training and electrical stimulation (ES) are techniques used to strengthen the paretic limbs of persons with spinal cord injury (SCI). However, data concerning the efficacy of these techniques for this population are limited. This study sought to better understand the efficacy of these techniques in patients with incomplete SCI.

Participants were referred to the study by community- and hospital-based therapists. The subjects included 20 individuals with chronic incomplete (ASIA C or D) SCI, with passive range of motion of at least 90° and strength of 3 to 4/5 as measured in the quadriceps. The participants were allowed to continue pretrial participation and general fitness for mobility programs. Subjects in an experimental group received ES superimposed on passive resistance training to the quadriceps muscles, thrice weekly for eight weeks.

The intervention comprised 12 sets of 10 knee extension repetitions. The first six sets involved ES superimposed on maximal voluntary knee extension. The second six sets involved ES-evoked muscle contractions alone. Those in the control group received no electrical stimulation or resistance training. The primary outcomes were voluntary strength (Nm) and endurance (fatigue

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ratio), as well as scores on the performance and satisfaction items of the Canadian Occupational Performance Measure. Secondary outcomes included electrically stimulated strength and endurance as well as participant perception of treatment efficacy.

Those patients receiving electrical stimulation plus resistance training had significantly greater increases in voluntary quadriceps strength ($p=0.034$). In addition, the between-group mean difference for participant perception of treatment effectiveness favored the treatment group ($p=0.000$).

Conclusion: This randomized, controlled trial of patients with chronic, partial spinal cord injury demonstrates that electrical stimulation, superimposed on voluntary resistance training, significantly increases voluntary strength and patient perception of efficacy.

Harvey, L., et al. Electrical Stimulation Plus Progressive Resistance Training for Leg Strength in Spinal Cord Injury: A Randomized, Controlled Trial. **Spinal Cord**. 2010, July; 48: 570-575.

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